Usability Factors Affecting the Adoption of ICT –Based Innovations among Female Genders in Nigeria.

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Abstract:-*Information and Communication Technology (ICT) innovations have made tremendous innovational impacts in empowering and enhancing women's capabilities globally. Despite these global impacts of ICT innovations on women empowerment, numerous investigations have shown that low literacy rate among women in Nigeria representing about 48.6%, and written language level used by ICT software developers, among others, pose significant gender digital divide reflected in women's poor adoption of ICT as compared to men. As ICTs become more complex, access and usage are increasingly constrained by literacy, income, and education levels. This study highlights the strategy to leverage ICT usage among female genders irrespective of one's literacy levels, gender or culture.The Unified Theory of Acceptance and Use of Technology (UTAUT) were adopted as the conceptual framework. In this study, the authors explored a narrative review of prior research that focused on the theoretical underpinnings of vast works of literature that revealed significant information on strategies ICT innovation developers use to create easy-to-use interfaces for the predominantly illiterates or semi-literates female genders. The authors also extracted peer-reviewed articles within the last five years from electronic databases, using some keywords such as "ICT usability", "ICT and illiterate users", "female gender and trends for ICT", etc. Results show that women ICT usability may increase if: (a) ICT interfaces designs that are easy-to-use. (b) ICT Interfaces incorporate the cultural backgrounds and literacy levels of users. (c) ICT Interfaces are user-centered, while pictorial images and voice prompts are engaged to cater for the literate, semi-literate and illiterate female users. The findings from this study may encourage ICT adoption, acceptance and sustainability among female genders that may positively close the gap in gender discrepancy in ICT usage, result in positive social change and national economic development in Nigerian.*
Keyword: *ICT, Female Gender, Usability, Easy-to-use, Interface, UTAUT, Literacy*

Date of Submission: 14-08-2019   Date of Acceptance: 30-08-2019

I.   Introduction

ICT innovations are enabled in complex interconnectivity platforms that seemingly play a positive role in the enhancement of women's capabilities.The potential of ICT as an enabler of modern technology-dependent innovations to improvewomen's capabilitieseverywhere (Cotter, 2018),reduce gender inequality, and strengthen the position of women in a society, is increasingly recognized. There are inadequacies or lack of sex-disaggregated ICT data, particularly from Nigeria, which makes it difficult, if not impossible, to make gender-related ICT policies, plans and strategies. "Without data there is no visibility; without visibility there is no priority" (UNCTAD, 2014, p.15). However, empirical studies in developing world, including Nigeria, have shown that significant gender gap exits, more evident in women's significantly lower technology participation rates than men due to entrenched socio-cultural attitudes (Antonio & Tuffley, 2014)**.** In Nigeria, the most significant factor that affects women adoption of ICT globally is the literacy and gender wage gap that puts women at a socio-economic disadvantaged class, and limits their access and adoption to ICT (Ashcraft, Brad, & Elizabeth, 2016). Another factor is women's economic dependence on male relatives that often results in women having less control over finances, which significantly impact their affordability of ICTs. Nigeriansocio-cultural norms and attitudes encourages gender power inequalities that resulted in marked gender disparities in education, income, political power, and cultural norms (Antonio & Tuffley, 2014; UNESCO, 2015), and further exacerbates the physical inaccessibility or unaffordability of ICT by women.But far greater divides exist due low literacy rate among women in Nigeria representing about 48.6%(UNESCO, 2015). As a result, the female genders do not perceive ICT system interfaces as usefulness and ease-of-use (Park & Kim, 2014).

Moreover, the world of ICT is majorly male-dominated(O'Donnell& Sweetman, 2018). This is because developers of ICT interfaces are dominated by men who are often employed by organizations who disproportionatelyprefer men rather than women (Ashcraft, et al., 2016). As a result, ICT interfaces, content, and applications are often morelikely to be tailored to men's interests and needs. The challenges are heightened

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by the low literacy rate among women in Nigeria representing about 48.6%, coupled with the written language level used by ICT software developers in the design of ICT system interfaces.Consequently, ICT innovations that might potentially play a significant beneficial role in the empowerment and enhancement of women's capabilities failed because the ICT system interfaces are not perceived as useful or easy-to-use by the female genders, which are majorly illiterate or semiliterate.

ICT innovations are seen as beneficial or advantageous only when they are perceived as useful or ease-of-use (Consoli, 2012).Perceived usefulness is "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989, p. 320).Perceived ease-of-use is "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320). Perceived usefulness and perceived ease-of-useare the primary precursors that determine the behavioural aim to use an ICT system (Venkatesh &Davis, 2000). Also, ICT innovations reflect the societies that create them, and such technologiesare affected by overlapping varieties of variables such as literacy, culture, embedded interfaces, gender, ethnicity, age, social class, geography, and disability, among others.United Nations Educational, Scientific, and Cultural Organization (UNESCO) 2015 Statistic Report placedthe Nigeria society literacy rate for adults aged 15years and older at 59.67%. The literacy rate for adult males and females are 51.4% and 48.6% respectively meaning that unlike the male gender, the female gender has more of illiterate folks and therefore experiences more usability challenges than the male folks.

A number of gender studies have shown that the main users of ICT innovations are young males(Soundari, 2016; Park & Kim, 2014),and that women are marginal users, suggesting a gap between discourse and the reality of women's empowerment through ICT. Women through ICT can be leveraged for personal security, better access to education and jobs, financial inclusion or basic healthcare information. However, these are not achievable except women have meaningful access to ICT which can be facilitated or prevented by several factors, including affordability, easy-to-use interfaces, relevant content, skills and security.The authors aimed to investigate these militating factors to ICT usability by the female gender and how to leverage the resultant ICT gender usability gap in Nigeria

1.1 Problem Statement

The literacy rate for adult males and females in Nigeria are 51.4% and 48.6% respectively (UNESCO, 2015), meaning that the female gender has more of the illiterate folks. ICT innovations, as enablers of empowerment and enhancement of women capabilities,can only be meaningful when driven by ICT system interfaces that areperceived as useful and easy-to-use, and aligned with users' cultural values, effort expectancy , social influence, facilitating conditions,ICT policies, rules, goals, and values in a sustainable manner. Our purpose in this narrative study was to identify ICT usability challenges that negatively impact its adoption by the female gender for empowerment and enhancement of capabilities. The general IT problem is the poor adoption of ICT innovations due to lack of easy-to-use ICT system interfaces,low literacy level, poor ICT practices and policies. The specific IT problem is that some ICT system interfaces, policies, laws, guidelines, and value system on the adoption and sustainability of ICT coupled with formulation and communication of same, do not favor female usability because such policies and practices are rendered impotent by corrupt practices, ignorance, illiteracy, and a bad economy.

1.2 Research Question

What are usability factors, policies, laws, guidelines and value system strategies that negatively affect ICT adoption among the female genders in Nigeria?

II. Conceptual Framework

The Unified Theory of Acceptance and Use of Technology (UTAUT), proposed by Venkatesh, Morris, Davis, & Davis (2003) was adopted as the conceptual framework for this study. UTAUT model claims that the benefits of using technology and the factors that drive users' decision to use it, is what determines users' acceptance behavior. The theory considers factors: user adoption behaviour toward intention to use ICT, and users' usage behaviour of ICT. Both user adoption and usage of ICT are affected by four constructs: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC), and four moderators: literacy level, gender, age, experience and voluntariness of use. UTAUT model in recent times has been widely adopted (Oye, AIahad, & Abrahim, 2014). UTAUT was adopted as our theoretical foundation to study usability factors affecting ICT adoption for sustainable women empowerment and enhancement, and the pros and con of its consumerization implications.

III. Literature Review

In Nigeria, there are gender-based constraints: gender power inequalities and differences in women's access to and control over assets and finance, unequal investments in the education and capabilities of girls and boys resulting in gender disparities in education, income, political power, and sharp discrepancies in the gender literacy levels.Technological characteristics usually include its user interface (Mouakket & Bettayeb, 2015). Good user interface management and usability have been established to be the key determinants of, perceived ease of use (Koenig& Schlaegel, 2014), while content value, blog management, and usability on the other hand were found to be the key determinants of perceived usefulness (Melzner, Heinze, & Fritscha, 2014), with entertainment value and content value interacting positively to affect perceived enjoyment (Wirtz& Göttel, 2016). For all Nigerian adult women ICT users with varying literacy levels to use the same innovation system interface and find them useful and easy to use, with sustainable performance expectancy, effort expectancy , social influence, and facilitating conditions, the ICT system interface must provide effective interaction platform that is understood by all users. According to SathishKumar and Kamalraj (2014), a combination of text and graphical metaphor may be the best user interface for a variety of people with varying abilities and literacy levels. Recent research by Bhadani, Shankar, and Rao (2016) also supports this strategy of using artifacts within the cultural environment of illiterate and semi-literate users. Bhadani, et al. (2016) noted that supporting interface services in local dialect can act as a catalyst in positioning the system as a socio-economic empowerment instrument that can enhance strategies to create easy-to-use system interface, promote adoption of multiple services to these multiple illiterate user groups. Lee, Chen, and Hess(2017)and Glaser and Schwan (2015) found that the pictorial appeal of a technology influenced users' perceived enjoyment of using the technology. The wait time literature, according to Lee, et al. (2017), suggests that affective cues such as voice prompts, can improve users' mood and perceptions as they use the system.

According to KuÈbler, et al. (2014), an ICT system for communication and control, developed by user-centered design standards, is evaluated and improved by three main factors: effectiveness, efficiency and satisfaction guidelines. Recent research by Punchoojit and Hongwarittorrn (2017) supported the claim by KuÈbler, et al. (2014). However, Punchoojit and Hongwarittorrn (2017) added some other factors such as safety (error tolerance), utility, learnability (easy to learn), memorability, and engaging, to validate and improve user-centered design standards required to make a system usable by women with varying abilities and literacy levels. The implication here is that if an interface is user-centered, it will be effective, performance expectant, effort expectant, efficient and satisfactory because according to Punchoojit and Hongwarittorrn (2017), and KuÈbler, et al. (2014), user-centered design standards evaluate and improve the effectiveness, efficiency and satisfaction of the illiterate and semi-literate system interface users. User-centered design impacts users' perceived usefulness perceived ease-of-use of the ICT system interface (Punchoojit& Hongwarittorrn, 2017; KuÈbler, et al., 2014).

Most of the existing graphical user interfaces in computer applications have failed to help users with limited literacy and skills to use ICT system (Ilyas, Ahmed, & Alshamari, 2013). There are only 59.67% of literate Nigerians adults aged 15years and older (UNESCO, 2015). The latest United Nations estimate of current Nigeria population as at March 9, 2017 was put at 190,279,273 with a median age of 18 years (Worldometers, 2017).According to United Nations World Population Prospects the 2015 Revision, about 62% of Nigeria populations are aged 15years or older (United Nations World Population Prospects, 2015). The implications of the above statements are: 62% Nigerians are aged 15years or older, 40.33% of Nigerians aged 15 years or older are illiterate or semiliterate, and 48.6% of adult Nigerian women are illiterates or semi-literates.The existing ICT system interfaces in Nigeria have failed to provide easy-to-use system interfaces for a variety of women with varying abilities and literacy levels which supports the need for this research to identify factors affecting ICT usability among illiterate women in Nigeria, and strategies to improve ICT interfaces. An interface that fails to incorporate the user, and "compromise" the users' varying abilities and capabilities that determines whether or not the product will be easy-to-use, has failed (Hyysalo & Johnson, 2014). This study intends to close this interface gap which may, in turn, close the ICT gender discrepancy gap.

Usability design should reflect culture in practice in order to improve user experience in the aspect of human interface design (Hoehle, Zhang, &Venkatesh, 2015). Culture does indeed influence interface acceptance, especially interface issues like colors, graphics, signs and placement of voice prompts which are elements that may have different connotations for people with different cultural backgrounds. Pictorial images and voice prompts provide effective communication platform that is understood by all literacy levels, better perception of learnability, self-efficacy, enjoyment and excitement than text-based interfaces, especially among illiterate and semi-literate users.Perceived learnability, self-efficacy, enjoyment and excitement were found in literature to be significant drivers of ICT usability among illiterate female gender (Aguboshim, & Udobi, 2019).

3.1Standards and Policies in sustainable Women ICT Adoption in Nigeria

In Nigeria, corrupt policies and practices, ignorance, illiteracy, and the bad economy appear to be the hidden contributing factors militating against women empowerment and enhancementthrough ICT. It is not enough to have ICT system interfaces that are acceptable by all. It is necessary and sufficient to run ICT innovations in Nigeria on acceptable ICT international standards and policies. Policy measures, laws, and infrastructures required to handle ICT sustainability for economic empowerment are rather relegated to the background. Implementation and adherence to policies control over policy enforcement, and enterprise definitions are no longer reliable or efficient in sustaining ICT innovations due to corrupt practices in Nigeria. Technological innovations in Nigeria have been made to be attitudinal, thereby rendering its sustainability impotent. Human adherence to required principles and policies for the adoption of ICTs has been claimed by a significant number of empirical researches as the major links the ICT sustainability, while the negligence of same constitutes a great risk to the ICT sustainability (Oladimeji & Foltyn, 2018).

Violations of established ICT policies and safeguards by users especially by some of our so-called honorable men in our society have led to poor ICT adoption for diversified economy.the need for ICT initiatives is essential to establish women's dignityand rights. For this to happen, they require attention on basic education, technical skills,and tailored training for women; employment of women in content creation; offeringeasier access and optimum use; above all engendering of ICT policies. The presentreality is a wakeup call for a policy change in order to close the ICT gender gap,especially from the perspective of women at the grassroots level. Their activeparticipation in designing and delivering content is the need of the hour for their ownemancipation and for the development of the country.'ICT initiatives need to be pro-poor, pro-rural and above all pro-women'.Equal rights and full participation of women in all spheres of ICT usability is required for full and complete development of any modern civilized nation (Yila&Azeez, 2018). To this end, certain policy measures must be put in place to address gender discrimination in information and communication technology adoption especially for the female gender that are predominantly illiterates.

IV. Methodology

In this study, the authors adopted a narrative review approach to review significant information based on the study conceptual framework, existing factors that affects ICTusability among the female genders in Nigeria. We also reviewed, analyzed and synthesized prior research findings. According to Hill and Burrows (2017), a narrative review is adopted where analysis and synthesis of different and related research findings are required to draw holistic interpretations or conclusions based on the reviewers' own experience, existing theories, and models. In this paper, we adopted a narrative methodology and explicitly explained the methodological commitments of narrative inquiry. We also made our search criteria and the criteria for inclusion explicit by including in our review process, keywords and term identification, article identification, quality assessment, data extraction, and data synthesis. Methodological triangulation has been defined as the use of multiple sources of data to gain multiple perspectives, maximize reliability and validation of data and build coherent justification of data interpretation that relates to the study case or phenomenon (Durif-Bruckert, et al., 2014). We adopted methodological triangulation to ensure the reliability and validity of data, and justification of interpretations from the reviews.

V. Data Collection

We reviewed the research findings that are relevant and related to our study. Many of such findings came from the ProQuest databases, ScienceDirect, Walden University international library databases and peer-reviewed, and other related texts. We also used phrases and terms as key search words in the databases for related literature on women adoption of ICTin Nigeria. Such phrases and terms included "ICT usability", "ICT and illiterate users", "female gender and trends for ICT", and many others. Our reviews incorporated 38 references. Ninety five percent (95%) of total references incorporated in the study is peer-reviewed, while (91%) are peer-reviewed journals that are within the last 5 years.

VI. Analysis and Synthesis of Prior Research

Recently, relevant and wide varieties of important literature have identified ICT as important innovation-enablers of sustainable empowerment and other ICT dependent interfaces (Oladimeji & Foltyn, 2018). However ,the implementation of ICT innovations in Nigeria, sustainable female gender empowerment have remained weak and vulnerable. Major contributing factors have been classified into four groups by Dwivedi, et al. (2015): (a) management of ICT processes, policies and guidelines, (b) literacy level of ICT users and how it impacts usage and adoption, (c) well defined ICT project size, goals, performance, robustness, and implementation, and (d) technology failures resulting from ICT use and misuse. On the other hand, Ho, Hsu, and Yen (2015) suggested three major strategies or skills to improve or manage ICT adoption, usage, and sustainability: (a) adherence to usability guidelines and policies, (b) process control, and (c) information and data transmission and dissemination. Other factors identified to affect access and use includeilliteracy, poor ICT

interface design strategy, lack of infrastructure, education, and sociocultural and economicchallenges. Thesegender gaps in ICTs in Nigeria requires the customization of the ICT interfaces to suit the women literacy and cultural backgrounds, and a change via training of women's attitudes towards ICT use. Educational and economic empowerment, and ICT policies and programs should be put in place to address the needs of women for the betterment of women and the society at large.

There is evidence that suggests that corrupt practices and non-adherence to policies and rules are increasingly exploiting ICT sustainability, and adversely affecting its usability in a sustainable manner. Reasons for non-sustainable ICT that also adversely affected the accruing benefits for women empowerment included problems associated with corrupt policies, and not placing required value to ICT by users (GreavuSerban & Serban, 2014), and limited perception of the usefulness and ease of use of ICT innovations (Aguboshim & Miles, 2019). The major reasons for this might be corruption, ignorance, and illiteracy. This claim is supported by UNDP statistical report that revealed the fact that 14% of Nigerian adults considered corruption as the major significant challenges militating against sustainable ICT in Nigeria (UNDP, 2016). There is a need for awareness and training in the country for people to understand and be able to perceive available technological innovations as useful and easy-to-use. This may bring about sustainable ICT that will leverage women's economic development and social change, and bridge the gender gap in ICT adoption.

VII. Conclusion

There is no one, single, "one size fits all" approach to measuring relationship between ICT adoption sustainability and women empowerment. The relationship between women, their empowerment and the use of ICTs in Nigeria is complex; there are no simple summaries or solutions. However, women's access to and use of ICTs cannot be understood in isolation from their gender positions and identities and how these positions and identities interact with their literacy levels, cultural backgrounds, political, and economic situation. When ICTs are fully implemented in all required sectors and systems, Nigerian women may start to reap the dividends capacity empowerment and enhancement and economic growth as witnessed in the developed nations with the best ICT facilities, and also achieve global objectives around gender equality and women's empowerment by 2030.Issues and challenges of ICTs in Nigeria should be given urgent and top priority attention in the national assembly and bills passed on the effective use of ICT for sustainable capacity empowerment and enhancement and economic development in Nigeria, powered by electricity supply that is stable.

VIII. The Way Forward

ICT innovations are now handled with better interconnected and interdependent facilities because connectivity is widely integrated into ambient or ubiquitous environments through an intuitive interface or "smart" interaction. The way forward to overcome the hindrances of ICT adoption by women is to engage ICT system interfaces that are easy-to-use, and that incorporates the cultural backgrounds and literacy levels of women. ICT interfaces that are user-centered, with pictorial images and voice prompts should be engagedto cater for the literate, semi-literate and illiterate female users, and may encourage ICT adoption, acceptance and sustainability among female genders that may positively close the gap in gender discrepancy in ICT usage, resulting in positive social change and national economic development in Nigerian.

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